IN THE CLAIMS:

Please amend Claims 1, 4, 7, 10, 13 and 14 as follows.

1. (Currently Amended) A method of optimally designing a structure in an area comprising a step of obtaining a solution of a structure optimal designing problem having a first solution process to solve an optimization problem of a first evaluation function for a status variable vector and a design variable vector, wherein the design variable vector is a rate of existence to a structural member in each divided area of the area, and the status variable vector is a displacement in each node of the divided area,

said first solution process comprising:

a design variable update step of reading the design variable vector and the status variable vector stored in a first storage unit, updating the design variable vector, and storing the updated design variable vector into said first storage unit;

a status variable update step of (a) reading the ~~updated~~ design variable vector and the status variable vector stored in a second storage unit, ~~updating the status variable vector, and storing the updated status variable vector into said second storage unit, said status variable update step including~~ (b) performing a second solution process to solve an optimization problem of a second evaluation function for the ~~updated~~ status variable vector and the ~~updated~~ design variable vector so as to obtain the status variable vector which minimizes the second evaluation function as a solution, wherein the second evaluation function corresponds to a norm of a residual vector which is obtained as a difference between a nodal force vector and the ~~updated~~ status variable vector on which a global stiffness matrix is operated, (c) updating the status

variable vector with the solution of the optimization problem of the second evaluation function, and (d) storing the updated status variable vector into said second storage unit; ~~and~~

a determination step of determining whether the update in said design variable update step and the update in said status variable update step are to be terminated; and

an output step of outputting an image of the structure corresponding to the design variable vector and the status variable vector after the updates are terminated, and otherwise returning to said design variable update step to update the design variable vector.

2. (Original) The method according to claim 1, wherein at said first solution process, any one of a sequential linear programming method, an optimality criteria method, and a sequential convex function approximate method is executed.

3. (Original) The method according to claim 1, wherein at said second solution process, any one of a conjugate residual method, a GCR method, a GCR(k) method, an Orthomin(k) method, a GMRES(k) method and their derivative methods is executed.

4. (Currently Amended) A method of optimally designing a structure in an area comprising a step of obtaining a solution of a structure optimal designing problem having a first solution process to solve an optimization problem of a first evaluation function for a status variable vector and a design variable vector, wherein the design variable vector is a rate of existence to a structural member in each divided area of the area, and the status variable vector is a displacement in each node of the divided area,

said first solution process comprising:

a design variable update step of reading the design variable vector and the status variable vector stored in a first storage unit, updating the design variable vector, and storing the updated design variable vector into said first storage unit;

a status variable update step of (a) reading the ~~updated~~ design variable vector and the status variable vector stored in a second storage unit, ~~updating the status variable vector, and storing the updated status variable vector into said second storage unit, said status variable update step including~~ (b) performing a second solution process to solve an optimization problem of a second evaluation function for the ~~updated~~ status variable vector and the ~~updated~~ design variable vector so as to obtain the status variable vector which minimizes the second evaluation function as a solution, wherein the second evaluation function corresponds to a norm of a residual vector which is obtained as a difference between a nodal force vector and the ~~updated~~ status variable vector on which a global stiffness matrix is operated, and said second solution process comprising a conjugate gradient method, and including a preconditioning step of executing preconditioning on a nodal force vector based on a global stiffness matrix, (c) updating the status variable vector with the solution of the optimization problem of the second evaluation function, and (d) storing the updated status variable vector into said second storage unit;

a determination step of determining whether the update in said design variable update step and the update in said status variable update step are to be terminated; and

an output step of outputting an image of the structure corresponding to the design variable vector and the status variable vector after the updates are terminated, and otherwise returning to said design variable update step to update the design variable vector.

5. (Original) The method according to claim 4, wherein at said first solution process, any one of a sequential linear programming method, an optimality criteria method, and a sequential convex function approximate method is performed.

6. (Original) The method according to claim 4, wherein at said preconditioning step, a component in a row or column of the nodal force vector is set to 0 when a diagonal component in the corresponding row or column of the global stiffness matrix becomes 0.

7. (Currently Amended) An information processing apparatus for optimally designing a structure in an area by obtaining a solution of a structure optimal designing problem having a first solution process to solve an optimization problem of a first evaluation function for a status variable vector and a design variable vector, wherein the design variable vector is a rate of existence to a structural member in each divided area of the area, and the status variable vector is a displacement in each node of the divided area, said apparatus comprising a first solution module adapted to execute said first solution process and comprising:

design variable update means for reading the design variable vector and the status variable vector stored in a first storage unit, updating the design variable vector, and storing the updated design variable vector into said first storage unit;

status variable update means for (a) reading the ~~updated~~ design variable vector and the status variable vector stored in a second storage unit, ~~updating the status variable vector, and storing the updated status variable vector into said second storage unit, said status variable update means including a second solution module adapted to execute~~ (b) performing a second

solution process to solve an optimization problem of a second evaluation function for the ~~updated~~ status variable vector and the ~~updated~~ design variable vector so as to obtain the status variable vector which minimizes the second evaluation function as a solution, wherein the second evaluation function corresponds to a norm of a residual vector which is obtained as a difference between a nodal force vector and the ~~updated~~ status variable vector on which a global stiffness matrix is operated, (c) updating the status variable vector with the solution of the optimization problem of the second evaluation function, and (d) storing the updated status variable vector into said second storage unit;

determination means for determining whether the update by said design variable update means and the update by said status variable update means are to be terminated; and

output means for outputting an image of the structure corresponding to the design variable vector and the status variable vector after the updates are terminated, and otherwise repeating the update of the design variable vector by said design variable update means.

8. (Original) The information processing apparatus according to claim 7, wherein said first solution module performs any one of a sequential linear programming method, an optimality criteria method, and a sequential convex function approximate method.

9. (Original) The information processing apparatus according to claim 7, wherein said second solution module performs any one of a conjugate residual method, a GCR

method, a GCR(k) method, an Orthomin(k) method, a GMRES(k) method and their derivative methods.

10. (Currently Amended) An information processing apparatus for optimally designing a structure in an area by obtaining a solution of a structure optimal designing problem having a first solution process to solve an optimization problem of a first evaluation function for a status variable vector and a design variable vector, wherein the design variable vector is a rate of existence to a structural member in each divided area of the area, and the status variable vector is a displacement in each node of the divided area, said apparatus comprising a first solution module adapted to execute said first solution process and comprising:

design variable update means for reading the design variable vector and the status variable vector stored in a first storage unit, updating the design variable vector, and storing the updated design variable vector into said first storage unit;

status variable update means for (a) reading the ~~updated~~ design variable vector and the status variable vector stored in a second storage unit, ~~updating the status variable vector, and storing the updated status variable vector into said second storage unit, said status variable update means including a second solution module adapted to execute~~ (b) performing a second solution process to solve an optimization problem of a second evaluation function for the ~~updated~~ status variable vector and the ~~updated~~ design variable vector so as to obtain the status variable vector which minimizes the second evaluation function as a solution, wherein the second evaluation function corresponds to a norm of a residual vector which is obtained as a difference between a nodal force vector and the ~~updated~~ status variable vector on which a global stiffness

matrix is operated, and said second solution process comprising a conjugate gradient method, and including a preconditioning step of executing preconditioning on a nodal force vector based on a global stiffness matrix, (c) updating the status variable vector with the solution of the optimization problem of the second evaluation function, and (d) storing the updated status variable vector into said second storage unit;

determination means for determining whether the update by said design variable update means and the update by said status variable update means are to be terminated; and

output means for outputting an image of the structure corresponding to the design variable vector and the status variable vector after the updates are terminated, and otherwise repeating the update of the design variable vector by said design variable update means.

11. (Original) The information processing apparatus according to claim 10, wherein said first solution module performs any one of a sequential linear programming method, an optimality criteria method, and a sequential convex function approximate method.

12. (Original) The information processing apparatus according to claim 10, wherein said preconditioning means sets a component in a row or column of the nodal force vector to 0 when a diagonal component in the corresponding row or column of the global stiffness matrix becomes 0.

13. (Currently Amended) A program stored in a computer-readable storage medium to be executed by an information processing apparatus for optimally designing a structure in an area, and comprising a module of obtaining a solution of a structure optimal designing problem having a first solution process to solve an optimization problem of a first evaluation function for a status variable vector and a design variable vector, wherein the design variable vector is a rate of existence to a structural member in each divided area of the area, and the status variable vector is a displacement in each node of the divided area, said module comprising a first solution module adapted to execute said first solution process and comprising:

a design variable update step of reading the design variable vector and the status variable vector stored in a first storage unit, updating the design variable vector, and storing the updated design variable vector into said first storage unit;

a status variable update step of (a) reading the ~~updated~~ design variable vector and the status variable vector stored in a second storage unit, ~~updating the status variable vector, and storing the updated status variable vector into said second storage unit, said status variable update step including a second solution module adapted to execute~~ (b) performing a second solution process to solve an optimization problem of a second evaluation function for the ~~updated~~ status variable vector and the ~~updated~~ design variable vector so as to obtain the status variable vector which minimizes the second evaluation function as a solution, wherein the second evaluation function corresponds to a norm of a residual vector which is obtained as a difference between a nodal force vector and the ~~updated~~ status variable vector on which a global stiffness matrix is operated, (c) updating the status variable vector with the solution of the optimization

problem of the second evaluation function, and (d) storing the updated status variable vector into said second storage unit;

a determination step of determining whether the update in said design variable update step and the update in said status variable update step are to be terminated; and

an output step of outputting an image of the structure corresponding to the design variable vector and the status variable vector after the updates are terminated, and otherwise returning to said design variable update step to update the design variable vector.

14. (Currently Amended) A program stored in a computer-readable storage medium to be executed by an information processing apparatus for optimally designing a structure in an area, and comprising a module of obtaining a solution of a structure optimal designing problem having a first solution process to solve an optimization problem of a first evaluation function for a status variable vector and a design variable vector, wherein the design variable vector is a rate of existence to a structural member in each divided area of the area, and the status variable vector is a displacement in each node of the divided area, said module comprising a first solution module adapted to execute said first solution process and comprising:

a design variable update step of reading the design variable vector and the status variable vector stored in a first storage unit, updating the design variable vector, and storing the updated design variable vector into said first storage unit;

a status variable update step of (a) reading the ~~updated~~ design variable vector and the status variable vector stored in a second storage unit, ~~updating the status variable vector, and storing the updated status variable vector into said second storage unit, said status variable~~

~~update step including a second solution module adapted to execute~~ (b) performing a second solution process to solve an optimization problem of a second evaluation functional for the ~~updated~~ status variable vector and the ~~updated~~ design variable vector so as to obtain the status variable vector which minimizes the second evaluation function as a solution, wherein the second evaluation function corresponds to a norm of a residual vector which is obtained as a difference between a nodal force vector and the updated status variable vector on which a global stiffness matrix is operated, and said second solution process comprising a conjugate gradient method, and including a preconditioning step of executing preconditioning on a nodal force vector based on a global stiffness matrix, (c) updating the status variable vector with the solution of the optimization problem of the second evaluation function, and (d) storing the updated status variable vector into said second storage unit;

a determination step of determining whether the update in said design variable update step and the update in said status variable update step are to be terminated; and

an output step of outputting an image of the structure corresponding to the design variable vector and the status variable vector after the updates are terminated, and otherwise returning to said design variable update step to update the design variable vector.